Golongan	RT (min)	Senyawa	Area	Proporsi
	31.536	1-Butyl 2-isobutyl phthalate	17851535	0.600
	10.1542	Pyrazine, 2-ethenyl-6-methyl-	13925092	0.468
	11.9024	Pyrazine, 3-ethyl-2,5-dimethyl-	13360651	0.449
	21.8143	3,3'-Bis(1,2,4-oxadiazolyl)-5,5'-diamine	7627067	0.256
	7.1753	Pyrazine, 2,3-dimethyl-	5910894	0.199
	14.697	Levomenthol	2216515	0.074
	20.197	Benzimidazole, 2-amino-1-methyl-	1622577	0.055
	31.2862	Galoxolide	1222055	0.041
	4.3867	Silanediol, dimethyl-	1066428	0.036
	3.4472	1H-Pyrrole, 2-methyl-	636419	0.021
	7.6807	1H-Pyrrole, 1-ethyl-	617925	0.021
	18.3597	2-Acetylaniline	551939	0.019
	30.2873	2-Ethylhexyl salicylate	118605	0.004
	30.5668	Isopropyl myristate	110270	0.004
	3.8337	Pyrrole	109977	0.004
	17.7175	Benzenamine, N,N-diethyl-3-methyl-	91678	0.003
	21.404	Caryophyllene	87445	0.003
	33.4089	Butyl 2-ethylhexyl phthalate	85698	0.003

RT : *Retention Time* (minutes)

The hydrocarbon compound identified in the vaname shrimp waste broth sample is dimethylspiro [4.5] decane 33.613%. Dekana has 75 structural isomers, all of which are liquid and flammable and decane is a component of gasoline. The 1,7-di-iso-propylnaphthalene compound is included in the alkene hydrocarbons while dimethylspiro [4.5] decane includes alkane hydrocarbons.

Volatile compounds from hydrocarbons can be derived from the decarboxylation reaction and the process of separating the carbon chains of fatty acids and thermal oxidation from unsaturated fatty acids (Chung et al. 2002 in Pratama et al. 2018). According to Liu (2009). Some cyclic hydrocarbons identified in fish are the result of secondary reactions from thermal oxidation (heating) of carotenoids and other unsaturated fats.

From a chemical standpoint, alcohol is a chemical compound containing an -OH group attached to carbon atoms and hydrogen atoms and / or other carbon atoms. The compounds in the alcohol group identified were as many as 10 in meat broth samples and 8 in vaname shrimp waste broth samples. (S) - (+) - 6-Methyl-1-octanol has the highest proportion in both samples, which is 1.507% in meat samples and 3.712% in waste samples. The compound (S) - (+) - 6-Methyl-1-octanol identified in meat broth samples and vaname shrimp waste broth has a role as a plant metabolite and includes primary alcohol and has a pungent odor (NCBI 2019).

The compounds in the aldehyde group identified were 17 compounds in vaname shrimp meat broth samples and 14 compounds in vaname shrimp waste broth samples. The aldehyde group identified was Heptadecanal in both samples, with a proportion of 13,648% in samples of vaname shrimp meat broth and 33.662% in samples of vaname shrimp waste broth. According to Pratama et al. (2018), a group of volatile compounds arising from fats or fatty acids, namely aldehydes, are generally produced from various activities related to chemical reactions including enzymatic reactions and auto fat oxidation.

The compounds in the ketone group identified were 13 compounds in vaname shrimp meat broth samples and 11 compounds in vaname shrimp waste broth samples. The compound that was identified in the vaname shrimp meat broth sample was β-iso-Methyl ionone 13,646%. According to Cha et al. (1992), volatile compounds that occur in ketones are products of thermal oxidation or

polyunsaturated fatty acid degradation. The β-iso-Methyl ionone compound is a light yellow colored liquid that has a fragrance odor (Lapczynski et al 2007).

The compound identified in the vaname shrimp waste broth sample is Bicyclo [3.2.1] oct-3-en-2-one, 4-methyl-2,107%. Generally, the ketone groups present in the sample are known to contribute to the sweet aroma of many crustaceans (Pratama et al. 2018). Bicyclo compound [3.2.1] oct-3-en-2-one, 4-methyl- is an olefinic compound and is derived from acrylic acid, commonly found in alcoholic beverages.

In addition to compounds from the hydrocarbon, aldehyde, alcohol and ketone groups, there were also several organic acids that were identified in both samples. Group of organic compounds identified were as many as 2 types in the sample of vaname shrimp meat broth and in the sample of vaname shrimp waste broth were identified 1 type. The compound that was identified in the sample of the broth is 0.555% Nonahexacontanoic acid vaname shrimp. The compound identified in the vaname shrimp waste sample was Nonanoic acid 0,004%. Nonanoic acid compounds or commonly called pelargonic acids include oily liquids with an unpleasant odor and rancidity, not easily dissolved in water (NCBI 2019).

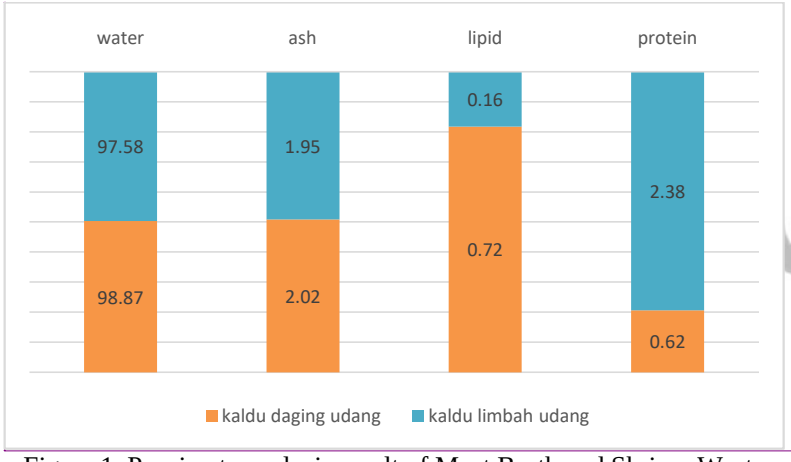
The esters group identified in vaname shrimp meat broth samples are of 2 types, Oxalic acid, bis (6-ethyloct-3-yl) ester which has the highest proportion of 13.664%. The formation of esters or esterification can occur if carboxylic acids are heated with alcohol, based on their composition the esters are divided into three groups namely fruit juice, fat or oil, and wax (Anjasari 2015). The compounds identified in the sample of vaname shrimp waste broth are 1 type, Hexadecanoic acid, methyl ester with a proportion of 0.004%

Other compounds are usually identified because there are other factors apart from the sample, such as plants or from environmental factors around the waters and the place of sale of the shrimp itself. There are 31 other types of compounds identified in vaname shrimp meat broth samples. Epicedrol has the

highest proportion of 13,645%. Epicedrol is a metabolite from plants (NCBI 2019). There were 24 species identified in the vaname shrimp waste broth sample. 2-Isoamyl-6-methylpyrazine has the highest proportion of 3.059%.

3.2 Proximate analysis

The proximate analysis provides general information about the chemical composition of the sample, nutrient content. The difference in results shows can be influenced by the composition of chemical raw materials, types of commodities processing stage (Pratama 2011). Proximate analysis consists of water content, ash content, fat content, and protein content. Proximate analysis of meat broth and vaname shrimp waste Figure 1.



Comment [rp2]: Fat ganti jadi lipid

Figure 1. Proximate analysis result of Meat Broth and Shrimp Waste

Water content is the main component making up the body of shrimp which is divided into two forms, namely free water and bound water. Free water can dissolve vitamins, mineral salts, and certain nitrogen compounds. Bound water is subdivided into several types such as chemically bound, physicochemical bound, and bound by capillary power (Jacoeb 2008). Water content is also one of the most important characteristics of food because water can affect the appearance, texture, and taste of food. Water content in food determines freshness and durability of these foodstuffs, high water content results in the ease of bacteria, mold, and yeast to multiply, so that changes will occur in food (Winarno 2008).

According to Pratama et al (2013), the ash content contained in a food is also influenced by several factors, such as the type of commodity, the growth phase, and environmental factors. Ash content of a food item indicates the presence of inorganic mineral content in the food material. Dayal et al. (2007)

minerals commonly contained in shrimp include calcium, magnesium, phosphorus, potassium, sodium, copper, iron, manganese, selenium, and zinc. These minerals will partially ignite at 550 ℃ so that when boiling at 65 ℃ does not have a significant effect on the ash content between boiled water / meat broth samples and vaname shrimp waste.

Lipid is one of the main ingredients in food. According to Jacoeb et al. (2008) lipid content is related to the flavor component because in the heating process the lipid will melt and will evaporate into the flavor component. Meat lipid content as much as 0.72% while fat content in waste as much as 0.16%, this proves that the protein content in meat is more than that of vaname shrimp waste. Lipids are one of the main sources of energy and contain essential lipids. The lipid component plays an important role that determines the physical characteristics of food such as aroma, texture, taste, and appearance if lipid is removed then one of the physical characteristics is lost (Sudarmadji et al. 1996).

Based on the results of the proximate analysis on vaname shrimp stew water samples, protein levels were obtained at 0.62% and on the vaname shrimp, waste boiled water samples protein levels were 2.38%. According to the broth BSN No. 01-4218 of 1996, the value of protein content that meets BSN is a minimum of 0.4%. This shows if the fat content of the two samples meets BSN. The higher the protein content, the better the quality, because protein content is the top priority in determining the best alternative for BSN value. This also proves that a lot of shrimp waste processing is used as an alternative food additive to the product.Various types of volatile compounds detected and identified fromthe sample are mostly derive from protein and lipid components,thus the types of volatile compounds are related to the sample's chemical compounds variability contained (Pratama et al 2018).Protein which is generally found in broth is a globular protein/spheroid protein. This protein is spherical, found in many foods such as milk, eggs, and meat. This protein dissolves in a solution of salt and dilute acid, and is also more susceptible to change under the influence of temperature, salt concentration, acidic solvents, and bases when compared to protein fibrils. This protein is easily denatured, that is, the composition of the molecule changes, followed by changes in physical and physiological properties as experienced by enzymes and hormones (Winarno 2008).

4. CONCLUSIONS

The group of compounds detected in meat and vaname shrimp waste is generally derived from aldehydes, alcohols, hydrocarbons, ketones, etc**.** The compounds that had the largest proportion in both samples were compounds of the 1,4-di-iso-propylnaphthalenee hydrocarbon group 13,648% for vaname shrimp meat broth and dimethylspiro [4.5] decane 33.613% for vaname shrimp waste broth. Proximate analysis results show that the vaname shrimp stew water sample has a moisture content of 98.87%, 2.02% ash content, 0.72% fat content, 0.62%

protein content, while the vaname shrimp waste boiled water sample has water content 97.58%, ash content 1.95%, fat content 0.16%, and protein content 2.38%.

References

[1] AOAC. 2005. *Official Methods of Analysis*. Association of Official Analytical Chemists. Benjamin Franklin Station. Washington.

[2] Apriyantono, A.1988. *Analisis Pangan*. PAU Pangan dan Gizi IPB. Bogor.

[3] Afriyanti, H. 2010. *Penggunaan Chitosan dari Cangkang Udang (Litopenaus vannamei) untuk Memperlama Waktu Simpan pada Tahu di Medan Tahun 2010*. Skripsi. Medan. Universitas Sumatera Utara.

[4] Association of Official Analytical Chemist (AOAC). 2005. *Official Methods of Analysis of AOAC International 18th Edition*. Gaithersburg, USA: AOAC International.

[5] Arpah, M. 1993. *Pengawasan Mutu Pangan*. Transito. Bandung.

[6] Barker J., Ando DJ., Davis R. dan Frearson M. 1999. *Mass Spectrometry 2nd Edition*. John Wiley and Sons. Newyork.

[7] Badan Pusat Statistik. 2013. *Jawa Barat Dalam Angka*. Badan Pusat Statistik Provinsi Jawa Barat.

[8] Badan Standardisasi Nasional. 1996. *Kaldu Daging*. SNI 01-4218-1996. Badan Standardisasi Nasional. Jakarta.

[9] Burdock, A.G. 2002. *Fenaroli's Handbook of Flavor Ingredients*. CRC Press. Boca Raton.

[10] Chung, H.Y., Yung, I.K.S., Ma, W.C.J and Kim J. 2002. Analysis of volatil components in frozen and dried scallops (*Patinopecten yessoensis*) by gas chromatography/mass spectrometry. *Food Research International.* 35:43-53.

[11] Damuringrum, A.A. 2002. *Mempelajari Karakteristik Baso Ikan nila dengan Penambahan Bubuk Flavor dari Ekstrak Kepala Udang Windu*. Skripsi. Fakultas Perikanan dan Ilmu Kelautan, Institut Pertanian Bogor. Bogor.

[12] Djelantik, D. 1999.*Pengetahuan dan Pengolahan Makanan*. Indonesia: Buku. Sekolah Trauner.

[13] Fardiaz, D. 1989. *Kromatografi Gas Dalam Analisis Pangan : Pentunjuk Praktikum*. Pusat Antar Universitas. IPB. Bogor.

[14] Grob, R.L., Barry, E.F. 2004. *Modern Practice of Gas Chromatography*, *Fourth Edition*. Wiley-IEEE. 2-3 p.

[15] Guillen, M.D., Errecalde, M.C. 2002. Volatile components of raw dan smoked black bream *(Brama raii)* and rainbow trout(*Oncorhynchus mykiss*) studied by means of solid phase microextraction and gas chromatography/mass spectrometry. *Journalof the Science of Food and Agriculture*, 82:945-95

[16] Haliman, R.W. dan Adijaya, D. 2005.Udang Vannamei. Penebar Swadaya. Jakarta.

[17] Haryadi, S,1994. Pengolahan Udang Beku. Penerbit Karya Anda, Surabaya.

[18] Hadiwiyoto. 1993. Teknologi Hasil Perikanan. Liberty. Yogyakarta.

[19] Högnadóttir, A. 2000. *Flavor Perception and Volatile Compounds in Fish*. Department of Food Science. University of Iceland.

[20] Jacoeb AM, Hamdani M, Nurjanah. 2008. Perubahan komposisi kimia dan vitamin daging udang ronggeng (*Harpiosquilla raphidea*) akibat perebusan. *Buletin Hasil Teknologi Perikanan*, 10(2).

[21] Kitson, F.G., Larsen, B.S. dan McEwen, C.N. 2002. *Gas Chromatography and Mass Spectometry : A Practical Guide*. Academic Press. USA.

[22] KKP. 2018. *Udang Vaname dan Udang Windu Andalan Ekspor Indonesia2011*. 10 Juni 2019. www.djpb.kkp.go.id. (diakses pada tanggal 25 September 2019)

[23] Linder, M., Ackman, RG. 2002. Volatile Compounds Recovered BySolid-Phase Microextraction From Fresh Adductor Muscle And Total Lipids Of Sea Scallop *:(Placopecten magellanicus)* from Georges Bank (Nova Scotia). *J Food Sci.* 67:2032-2037.

[24] Liu, J.K., Zhao S.M. dan Xiong S.B. 2009. Influence of recooking on volatile and non-volatile compounds found in silver carp*Hypophthalmichthys molitrix*. *Fish Sci.* 75:1067-1075.

[25] Liu H., D. Li and Guo. S 2008. Rhological properties of channel catfish (Ictalurus punctaus) gelatin from fish skin preserved by different methods. *LWT- Food Scince and Technology*, 41:414-419.

[26] Liu, J.K, Zho, S.M and Xiong S.B. 2009. Influence of Recooking on Volatil and non-Volatil Compounds Found in Silver Carp Hypopthalmihthys molitrix. *Fish Science* 75:1067-1075.

[27] Mirzah dan Filawati. 2013. *Pengolahan Limbah Udang untuk Memperoleh Bahan Pakan Sumber Protein Hewani Pengganti Tepung Ikan. Jambi.* Universitas Jambi Fakultasi Peternakan.

[28] Nata, I. 2018. *Komposisi Senyawa Flavor Volatil Ikan Gabus Segar dan Hasil Pengukusannya*. Skripsi. Fakultas Perikanan dan Ilmu Kelautan, Universitas Padjadjaran. Sumedang.

[29] Naknean, P., dan Meenune, M. 2010. Review article factors affecting retention and release of flavour compounds in food carbohydrates. *International Food Research Journal*, 17:23-34.

[30] National Center for Biotechnology Information. PubChem Database. https://pubchem.ncbi.nlm.nih.gov (Diakses pada 18 November 2019)

[31] Pratama, R.I. 2011. *Karakteristik Flavor Beberapa Jenis Produk Ikan Asap di Indonesia.* Thesis. Institut Pertanian Bogor. Bogor.

[32] Pratama, R.I., Rostini, I dan Awaluddin, M.Y. 2013. Komposisi Kandungan Senyawa Flavor Ikan Mas (Cyprinus carpio) Segar dan Hasil Pengukusan. *Jurnal Akuatika*, 4(1): 55-67.

[33] Pratama, R.I., I. Rostini & N. Kurniawati. 2017. Komposisi Senyawa Flavor Volatil Ikan Nila (Oreochromis niloticus) Segar dan Kukus pada Suhu Ekstraksi Berbeda. *Article Riview*.

[34] Pratama, R.I., I. Rostini & Rochima E. 2017. Amino Acid Profile and Volatile Compounds of Raw and Steamed Patin Catfish (*Pangasius hypophthalamus*) and Narrow-barred Spanish Mackarel (*Scomberomorus*

commerson). *IOP Conf. Series. Earth and Environmental Science*. 116:1-17.

[35] Pratama, R.I, Rostini I dan Rochima E. 2018. Profil Asam Amino, Asam Lemak dan Komponen Volatil Ikan Gurame Segar (*Osphronemus Gouramy*) dan Kukus. *JPHPI*. 21(2): 219-232.

[36] Pratama, R.I, Rostini I dan Liviawaty E. 2018. Volatile components of raw Patin Catfish (*Pangasius hypophthalmus*) and Nile Tilapia (*Oreochromis niloticus*). *IOP Conf. Series: Earth and Environmental Science*.

[37] Rothe, M. 1989. *Introduction to aroma research*. Kluwer Academic Publisher. Dordrecht.

[38] Sudarmadji. S., Haryono, B., Suhardi. 1996. *Analisa Bahan Makanan dan Pertanian*. Liberty Yogyakarta. Yogyakarta.

[39] Sugiyono. 2012. *Metode Penelitian Kuantitatif Kualitatif dan R&D*. Alfabeta. Bandung.

[40] Sundari, D., Almasyhuri dan Lamid, A. 2015. Pengaruh Proses Pemasakan Terhadap Komposisi Zat Gizi Bahan Pangan Sumber Protein. *Media Litbangkes.* 25(4).

[41] Suptijah, P. 1992. Pengaruh berbagai isolasi khitin kulit udang terhadap mutunya.*Jurnal Penelitian Perikanan Indonesia*, 3(1):1-9.

[42] Widyati, R. 2001. *Pengetahuan Dasar Pengolahan Makanan Indonesia*. PT Grasindo, Jakarta.

[43] Wijaya, N.I. 2018. *Komposisi Senyawa Flavor Volatil Ikan Gabus (Channa striata) Segar dan Hasil Pengukusannya*. Skripsi. Fakultas Perikanan dan Ilmu Kelautan, Universitas Padjadjaran. Sumedang.

[44] Winarno, F.G. 2008. *Kimia Pangan dan Gizi: Edisi Terbaru*. Gramedia Pustaka Utama. Jakarta.

[45] Yamaguchi, K and Watanabe, K. 1990. Taste-active components of fish and shellfish.*Science of Processing Marine Products Vol I. Hyogo International Centre: Japan International Cooperation Agency*:111-112.

[46] Yuniar, I. 2018. *Komposisi Senyawa Flavor Volatil Udang Windu Segar dan Hasil Pengukusannya*. Skripsi. Fakultas Perikanan dan Ilmu Kelautan, Universitas Padjadjaran. Sumedang.